1909
July 25 The first flight across the English Channel by Louis Blériot.

The U.S. Army accepted delivery of the first military plane and paid the Wright brothers $30,000 for it.

1911
September 29 Walter Brookins set American record by flying 192 miles from Chicago to Springfield, Illinois, making two stops.

December 10 Cal Rodgers completed the first trans-continental flight in the Wright *EX Vin Fiz*.

1912
April 16 American Harriet Quimby became the first female pilot to fly a plane across the English Channel.

May 30 Wilbur Wright died of typhoid fever.

1909 NAACP founded | **1911** Ragtime popularized for mass audiences | **1912** Girl Scouts chartered

World War I: The First Air War

■ Only eleven years old in August 1914, the fragile airplane in its role as an observer contributed significantly to the murderous carnage that characterized combat in World War I.

The great killer of the war was artillery, and aerial reconnaissance vastly increased artillery's effectiveness. Observation aircraft photographed and mapped trenches and military positions, reported transient targets, and provided direct control for artillery batteries. Further, aircraft photographs and reports enabled commanders to identify the enemy's position, determine his strength, surmise his intentions, and organize their response to best effect.

The need to protect one's own observation aircraft or deny the air to the enemy quickly led to a quest for control of the air. In 1915, an asynchronization or "interrupter" mechanism allowed machine guns to fire through a spinning propeller, enabling the pilot to aim the entire airplane. This ability gave birth to the "pursuit" or fighter. To gain superiority in the air, the airplane now hunted other airplanes. Over time, this new role demanded more sophisticated machines and combat techniques, and the men who flew the machines, as well as the machines themselves, became famous, dramatic symbols of knightly combat.

Soon, the airplane was also used as a bomber. Initially, pilots simply tossed small, handheld bombs or even darts from the cockpit. But the potential of destruction from the air quickly led to larger, more powerful, often multi-engine airplanes designed specifically for bombing. The size of the bombs themselves grew rapidly, and mechanical sights enabled aircraft to hit targets more accurately and from higher altitudes. Most aerial bombardment targeted enemy troops and facilities along the front, but the airplane also allowed the war to be carried to manufacturing and population centers far behind the lines. In 1915, Germany began Zeppelin raids against England. The Zeppelins—large, slow, rigid airships filled with explosive hydrogen gas—ultimately proved vulnerable to aerial defenses and were gradually replaced by giant multi-engine strategic bombers, the vanguard of future war.

By 11 November 1918, the end of the war, commanders had explored almost every role that the airplane would play in the future except global air transport. Although the airplane was not the decisive weapon of World War I, it had demonstrated its potential to change the way wars were fought.

The Fokker was flown by the "Red Baron."

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The Flying Aces

■ French newsmen crowned Adolphe Pégoud the first "flying ace" in 1915. In France and England, the title came to identify a pilot who had shot down five enemy airplanes. The Germans adopted a similar system that required ten victories. In any case, the airmen, especially the fighter pilots, quickly emerged as the great heroes of an unheroic war. The German airman Manfred von Richthofen, the "Red Baron," led the pack with a total of 80 victories. The French ace René Fonck survived the war with 75 victories. With 58 victories, Edward "Mick" Mannock was England's most victorious ace, despite an infection that had caused him to experience temporary blindness and subsequent trouble seeing out of his left eye. Captain Edward Rickenbacker, a Medal of Honor winner and America's "Ace of Aces," scored 26 victories during a relatively short career as a combat pilot in 1918.

Britain's Sopwith Camel, a single-seat fighter introduced in 1917, was armed with two guns and could also carry four small bombs. The Camel scored more victories against German aircraft than any other Allied plane in World War I. National Air & Space Museum #85-11071 ©2002 Smithsonian Institution

1928
June 28–29 Albert Hegenberger and Lester Maitland accomplished the first nonstop crossing of the Pacific.

1929
November 28–29 Commander Richard E. Byrd completed the first flight over the South Pole.

1929
Fritz von Opel of Germany flew the first rocket-powered plane for 1 minute, 15 seconds.

William Green developed the first automatic pilot used on an airliner.

1931
June 23–July 1 Wiley Post and Harold Gatty completed the first circumnavigation of the world by a lone aircraft.

1932
May 20–21 Amelia Earhart became the first woman to fly solo across the Atlantic.

1928 First scheduled television broadcast | **1929** Great Depression began with stock market crash | **1931** Empire State Building completed

U.S. government accepted the Wright aircraft in 1909.

Origins of the U.S. Air Force

■ U.S. Army leaders were never as backward about accepting aviation as tradition claims. Many, in fact, had long maintained an interest in lighter-than-air and heavier-than-air craft. The Signal Corps established a balloon section in 1892 and deployed a balloon to Cuba in 1898 during the Spanish-American War. Signal Corps balloonists competed in contests and set records. Notably, Lieutenant Frank Lahm won the first Gordon Bennett balloon race in 1906. The Army also developed semi-rigid dirigibles beginning with Signal Corps Dirigible No. 1 in 1908.

As for heavier-than-air craft, Army leaders gave Samuel P. Langley $50,000 for construction of a full-sized "aerodrome" in 1898. Langley failed to fly, but Army interest in aviation continued. Its leaders began correspondence with the Wright brothers in May 1907, established an Aeronautical Division in August, and prepared requirements for a military airplane in December. The Army accepted the Wrights' bid in February 1908. Trials began later in the year, but a crash delayed the results. The U.S. Army ultimately accepted Signal Corps No. 1 on 2 August 1909.

Today's global U.S. Air Force grew from the Aeronautical Division and this first airplane, but the road to independence was tortuous. The U.S. Army established the Air Service in May 1918, and in 1926, the Air Service became the U.S. Army Air Corps. Creation of the U.S. Army Air Forces in 1941 provided the autonomy necessary for victory during World War II. The U.S. Air Force achieved full independence on 18 September 1947.

First Ladies of Flight

■ The role women have played in the progress of aviation is punctuated by the achievements, many of them "firsts," of hundreds of brave and determined aeronautical pioneers.

These pioneers included women like Juanita Pritchard Bailey, the first woman to fly a plane solo from the United States to Panama, and Evelyn "Bobbi" Trout, who, in 1929, became the first woman to complete an all-night flight.

The following year, Amy Johnson, considered by many to be Britain's most famous female pilot, became the first woman to fly alone from England to Australia. In 1931, Anne Morrow Lindbergh, wife of Charles Lindbergh, became the first woman to receive a glider pilot's license.

But even before the considerable accomplishments of these women, Alabama-born Katherine Stinson was well on her way to a series of "firsts" all her own. In 1912, Stinson became the fourth woman to be issued a pilot's license. In 1913, she became the first woman to carry the U.S. mail; in 1915, she became the first woman to perform an aerial loop-the-loop. That same year, Stinson became the first woman to skywrite.

The honor of being the first woman to fly across the Atlantic belongs to Amelia Earhart, although on the first trip, she was a passenger. In 1932, however, she was at the controls and became the first woman to make the trip solo. Later, she was also the first woman to earn the Distinguished Flying Cross.

Amelia Earhart, nicknamed "Lady Lindy," proved her skill by becoming the first woman to fly solo across the Atlantic. National Air and Space Museum #381-1431 ©2002 Smithsonian Institution

1959
September 15 Scott Crossfield first flew the fastest and highest flying aircraft in history, the rocket-powered X-15.

1960
May 17 YF4H-1 Phantom fighter and Douglas DC-8 were unveiled.

1960 John F. Kennedy elected U.S. President

Helios prototype, a high-flying, solar-powered craft.

Unconventional Methods of Flight

■ A bird's ability to fly, powered by its own unique musculoskeletal system, has, for thousands of years, inspired humanity's desire to fly and especially to achieve flight without the use of anything other than muscle power.

Paul B. MacCready envisioned, designed, and built the human-powered Gossamer Condor, a 70-pound craft with a wingspan of 96 feet, made of aluminum, mylar, corrugated cardboard, and styrene foam. In 1977, the Condor flew 1.35 miles in just under eight minutes, its average speed between 10 and 11 miles per hour.

In 1979, the Gossamer Albatross was "pedaled" from England to France, making it the first completely human-powered aircraft to cross the English Channel.

Inspired by the Greek myth of Daedalus and Icarus, the Daedalus Project was conceived to fly a human-powered aircraft nearly 100 miles. On 3 April 1988, the 69-pound Daedalus 88 made the flight between the island of Crete and the island of Santorini, a distance of 115.11 kilometers, or 71.53 miles.

Over the next 15 years, the lightweight human-powered aircraft evolved into lightweight, high-altitude, solar-powered aircraft. This series of research aircraft set numerous records, culminating in the recordbreaking flight of the Helios aircraft to 96,863 feet over Hawaii during 2001. This lightweight, unpiloted, propeller-driven, solar-powered, 247-foot-long aircraft is a prototype for future long-duration, high-altitude flights spending days aloft using only the Sun for power, either directly or through new advanced fuel cells that store the Sun's energy. This high-flying wing could significantly enhance scientific missions studying Earth, assist farmers, act as a telecommunication platform, enhance weather observation, and provide disaster monitoring and emergency response.

Testing the Boundaries

■ A desire to expand the capabilities of aircraft led airplane designer Burt Rutan to the ambitious idea of building an airplane that could fly around the world without refueling. His Voyager achieved the task.

Rutan used an ultralight graphite composite for the plane, designing it with long, knifelike wings that would, along with other frame areas, be filled with fuel. In fact, three-fourths of the Voyager's total weight was composed of fuel.

On 23 December 1986, Voyager completed a nine-day flight that ended in California. The Voyager had circumnavigated the world, a nonstop trip of 25,000 miles, without refueling.

A Typical Day in Space

■ Surprisingly enough, many aspects of a typical day in the life of an astronaut are quite similar to those of a typical day at a more Earthly job. Being in orbit does, of course, present some different challenges, as well as different perks. There is the weightlessness to consider, but the views are amazing.

According to former astronaut Dr. Guion "Guy" Bluford, the first African American in space, each astronaut's day is heavily scheduled by ground control. "Every minute is accounted for," said Dr. Bluford, "and each astronaut is responsible for multiple tasks, whether it's deploying a satellite, conducting experiments, helping to fly the Shuttle, or maintaining the vehicle."

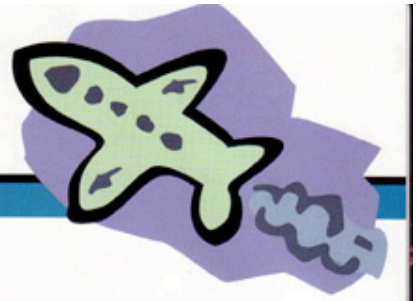
In addition to the time allotted for work, there is also time set aside for sleeping, exercising, doing nothing (yes, "breaks" are also scheduled), and eating.

Some astronauts even like the food, though it does have to be reconstituted from its dehydrated state. Menu items like shrimp cocktail, scrambled eggs with bacon, and beefsteak burritos are pretty normal fare while in orbit.

Being an astronaut means being well trained and ready to perform whatever task the mission commander assigns. Just like jobs on Earth, there's a boss. This one, however, probably doesn't mind too much when employees are seen staring off into space.

Guy Bluford served on four Shuttle missions—STS-8, STS-61-A, STS-39, and STS-53.

Aviation Fun!



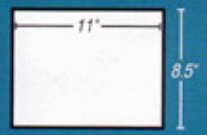
Do You Wonder Why?

1. Why do they push the plane from the gate?
2. Why do we need oxygen masks in case of emergency?
3. Why do my ears pop as we go up to and come down from cruising altitude?
4. Why do we need to have tray tables up and seats in their upright position for takeoff and landing?

(Find answers at bottom of page.)

Ring Wing Glider

This wing demonstrates the great room there is for aeronautics innovation. Can you design a better wing?



1. Fold 8.5 x 11-inch paper diagonally as shown.

2. Make a half-inch fold along the previously folded edge.

3. Make a second half-inch fold.

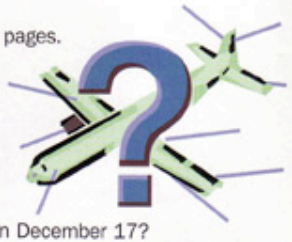
4. Curl the ends of the paper to make a ring and tuck one end into the fold of the other.

5. Gently grasp the "V" between the two "crown points" with your thumbs and index fingers and toss the glider lightly forward.

The folds in the paper make an airplane wing where the front end is heavy and the back end is light. Curling the ends to make a ring changes the shape of the wing and improves the wing's flight performance.

Scavenger Hunt!!

Find the answers to each of these in the previous pages.



- Why was Kitty Hawk, North Carolina, chosen for the test flights of the Wright brothers?
- What type of flying vehicle is credited to the "father of aeronautics?"
- Who was the first African American woman to receive a Fédération Aéronautique Internationale (FAI) license?
- Who pioneered rubber-band-powered motors called aerodromes in the 1800s?
- What total distance did the first four powered flights of the Wrights' 1903 flyer travel on December 17?
- What is the name of the remotely piloted aircraft that is being developed to fly at a high altitude for a long duration?
- How long was Lindbergh's flight across the Atlantic?
- Name two early flight pioneers who used birds as the inspiration for flights using solar power.
- Who were the first passengers aboard a hot air balloon?
- Who was the first person to step on another world and when?
- What was the first commercial jet aircraft?

pressurized so passengers have the correct mix of air in the cabin. If there is a sudden change in the aircraft's pressurization, a mask would drop to give passengers needed oxygen. 3. Even though the cabin is pressurized, there are still slight changes in pressure as the airplane's altitude changes. 4. So you and others in your row could exit the row and airplane quickly and safely in an emergency.